

# USING PUBMED SEARCH STRINGS FOR EFFICIENT RETRIEVAL OF MANUAL THERAPY RESEARCH LITERATURE



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## ABSTRACT

**Objective:** The aim of this study was to construct PubMed search strings that could efficiently retrieve studies on manual therapy (MT), especially for time-constrained clinicians.

**Methods:** Our experts chose 11 Medical Subject Heading terms describing MT along with 84 additional potential terms. For each term that was able to retrieve more than 100 abstracts, we systematically extracted a sample of abstracts from which we estimated the proportion of studies potentially relevant to MT. We then constructed 2 search strings: 1 narrow (threshold of pertinent articles  $\geq 40\%$ ) and 1 expanded (including all terms for which a proportion had been calculated). We tested these search strings against articles on 2 conditions relevant to MT (thoracic and temporomandibular pain). We calculated the number of abstracts needed to read (NNR) to identify 1 potentially pertinent article in the context of these conditions. Finally, we evaluated the efficiency of the proposed PubMed search strings to identify relevant articles included in a systematic review on spinal manipulative therapy for chronic low back pain.

**Results:** Fifty-five search terms were able to extract more than 100 citations. The NNR to find 1 potentially pertinent article using the narrow string was 1.2 for thoracic pain and 1.3 for temporomandibular pain, and the NNR for the expanded string was 1.9 and 1.6, respectively. The narrow search strategy retrieved all the randomized controlled trials included in the systematic review selected for comparison.

**Conclusion:** The proposed PubMed search strings may help health care professionals locate potentially pertinent articles and review a large number of MT studies efficiently to better implement evidence-based practice.

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**Key Indexing Terms:** *Manual Therapy; PubMed, Utilization; Evidence-Based Practice*

Evidence-based practice is a pressing concern for all health care professionals,<sup>1</sup> which begins with the formulation of a clinical question that can be answered using existing evidence. Like other forms of research, the key

to successful research using the current literature depends on a robust methodological strategy. Once the question is formulated, clinicians must carefully plan their search strategy including identification of search terms and databases.

Literature databases are widely available through the Internet, although none of these databases is totally comprehensive.<sup>2</sup> Bibliographic searches on a topic related to manual therapy (MT) are often needed in contemporary practice, but they are often a challenge because practitioners are compelled to search multiple databases.<sup>3,4</sup> However, the sheer magnitude of articles retrieved does not necessarily equate to quality. Indeed, each article retrieved must be carefully and critically read, a time-consuming endeavor for clinicians. Evidence-based search strategies have been shown to positively influence the effectiveness of literature searching.<sup>5</sup> Although such strategies have been developed in clinical medicine,<sup>6</sup> they are difficult to transpose to MT. The literature on MT is drawn from professionals of different disciplines that may use different words to describe the same concepts, a situation that requires an explicit approach to resolve.<sup>7</sup>

Rollin et al<sup>8</sup> reported that 90% of high-quality intervention studies included in Cochrane reviews could be retrieved searching PubMed, the database managed by the US National

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Library of Medicine (NLM). They concluded that searching PubMed only is more cost-effective than previously thought, which is a highly relevant consideration, given that this database is freely accessible. As a consequence, an MT practitioner could efficiently retrieve most part of literature on a topic using PubMed database.

Search strategy in a database can be conducted by a clinician using MeSH terms (Medical Subjects Heading terms—NLM-controlled vocabulary thesaurus used for indexing articles), not-MeSH terms, or a combination of these terms. For example, members of our research team developed and tested PubMed search strings to explore the occupational determinants of diseases.<sup>9</sup> Rational use of MeSH terms is becoming increasingly important, also considering terminological overlaps in the MeSH vocabulary and their different possible use during manual indexing at the NLM. A clinician, searching PubMed, may omit relevant terms (MeSH or not) or may repeat several times similar searches with the result of wasting time by reading abstracts that are not pertinent or not finding articles that are relevant to the clinical question.

Tailored PubMed search strategies need to be developed for areas of investigation, such as for MTs. The aim of this study was to identify efficient PubMed search strategies to retrieve articles regarding the MT to help simplify searching for evidence by ensuring an acceptable yield of pertinent articles in a short amount of time.

## METHODS

### Overview

Our research team was composed of different professionals including physicians, physical therapists, epidemiologists, and statisticians. Using the study design and methodological approach developed by Mattioli et al,<sup>9</sup> we compiled a list of search terms that we deemed particularly pertinent to MT.

Then, we explored the yield of each search term in PubMed considering the number of articles identified by the individual term. For each search term, we then determined the proportion of retrievable articles that could be considered potentially pertinent to MT. We then designed 2 search strings (1 narrowly focused, 1 expanded), to be used in different contexts.

Subsequently, we measured the search strings efficiency through the “number needed to read” (NNR), which quantifies the number of abstracts that might have to be read to locate 1 pertinent manuscript (NNR = number of retrieved abstracts/number of potentially pertinent abstracts, which is equal to 1/precision).<sup>10</sup> Finally, we tested their capability in retrieving relevant articles using a systematic review on MT and chronic low back pain (CLBP) for comparison.<sup>11</sup>

### Selection of Terms

Using the PubMed MeSH database, which is the NLM-controlled vocabulary thesaurus used for indexing articles,

the research team considered MeSH terms along with their various subheadings related to MT. The field tag [MH] or the field tag [MeSH] may be added to a term to restrict a search to MeSH terms only. We selected 11 MeSH terms as likely pertinent to MT: *Chiropractic*[MH]; *Exercise Movement Techniques*[MH]; *Exercise Therapy*[MH]; *Manipulation, Orthopedic*[MH]; *Manipulation, Osteopathic*[MH]; *Massage*[MH]; *Muscle Relaxation*[MH]; *Muscle Stretching Exercises*[MH]; *Musculoskeletal Manipulations*[MH]; *Osteopathic Medicine*[MH]; *Traction*[MH].

Based on the authors' combined clinical expertise, group discussion, and culling other terms from preliminary PubMed searches, we further identified 84 non-MeSH terms.

### Estimating Proportions of Pertinent Articles

In November 2011, we tested all the identified search terms on PubMed by introducing them one by one in the database to obtain the number of citations retrieved by each term. Limits were set for articles added to PubMed before November 1, 2011, and with available abstract. Furthermore, we added the words *NOT (animals [MH] NOT humans [MH])* at each query.

To decide the pertinence of each abstract to MT, we referred to the definition of MT adopted by the International Federation of Orthopaedic Manipulative Physical Therapists.<sup>12</sup> As a consequence, abstracts on both passive manual techniques (massage, traction, translation, mobilization, manipulation, etc) and abstracts on active exercises (strengthening exercises, proprioceptive neuromuscular facilitation, active stabilization, etc) were included. Abstracts dealing exclusively with physical modalities, medications, splints, acupuncture, or nonconventional treatments were excluded.

The proportion of pertinent articles was calculated based on a sample of 100 articles. Based on the total number of retrieved abstracts, we systematically extracted abstracts by setting the PubMed “show” function to a number per page that allowed us to select the study at the top of the page for inclusion. This methodology assured that our sample would be chronologically representative.

The pertinence of each article was assessed manually by 4 pairs of physical therapists (MB and SB, GD and IG, SM and JP, and FD and AC) who independently examined each abstract and determined whether the abstract contained information relevant to the topic of MT. Regarding interobserver variability, these 4 pairs achieved a  $\kappa$  value of 0.67, 0.90, 0.98, and 0.90, respectively, corresponding to “good/very-good” agreement in a preliminary assessment of 100 abstracts.<sup>13</sup> In case of disagreement, pertinence was adjudicated by 3 physical therapists (PP, CV, and SF). In case the term under study extracted less than 100 abstracts, we did not calculate the proportion of pertinent articles.

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